Synthesis

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Contents

What's Next

Highlights from the next issue –

- AssessUrBook
- BiOX™
- TRICHOGREEN™
- SSMS 500
- RIFIELD

Revitalising the Agriculture Sector — UPM's Proactive Role

Professor Dr. Zulkifli Idrus, Director, Research Management Centre, UPM

The agricultural sector at UPM has contributed significantly to the growth and development of the Malaysian economy. We must ensure that the sector's contribution to the national economy and its global competitiveness remain strong in the future.

Malaysia is currently the world leader in research of tropical agricultural products. We must continue to enhance our excellence in research and development of new agricultural industries and products from our primary commodities and natural resources. Developing new industries from our rich natural resources will assist in the industrialization of the nation, whilst developing new high value products from the agricultural commodities as well as agricultural waste and by products would further improve our productivity and global competitiveness. Creating new markets for our products will assure the continued significant contribution of the sector to export earnings. Pursuing integrated agro forestry development and good sustainable agricultural and forestry practices will ensure an ecologically balanced development, whilst increasing the production of major food products which are cost competitive will enhance food security and enable Malaysians better access to quality food at affordable prices.

To achieve excellence in agriculture, human resource development especially in new and emerging areas of agricultural science as well as professional farm managers to run large-scale mixed farming enterprises are essential. Emphasis will therefore be put towards developing those expertises.

The research in the Plantations & Commodities sector at UPM is multidisciplinary, market-driven and top-down in key areas such as agriculture, forestry, food, wood-based products and development of oils & fats which fosters. partnerships and linkages with national and international research centres and industries to facilitate research and accelerate commercialization of discoveries and inventions. Various research centers and institutes at UPM spearhead research and development in cutting edge areas of agricultural, physical & chemical sciences, information technology, and engineering. In addition to the existing centres of excellence, UPM has recently developed new institutes and centres in key technology areas to forge effective linkages between UPM and the agro industries in particular. There are various R&D projects at UPM that foster the orderly development of the plantation and commodity sector, achieve higher value-added through downstream processing and promote the marketing of commodities, particularly semi-processed and processed.

Our University is a large and dynamic organisation and we have used our resources wisely, through detailed strategic planning, increased benchmarking, quality management and modern streamlined systems. Major research findings in the areas of plantation and commodities explain these inputs and chronicle outcomes such as high-achieving and employable graduates, quality research which solves problems and generates discoveries of global significance, and valuable partnerships involving the wider community.

University Senators, students, staff, graduates and many other supporters contributed to this year's excellent scorecard. I believe that without their efforts, we could not have done so well, nor could we look forward so confidently to such an exciting future. I thank them all for helping us advance our aspirations.

JESKYL - A genetically-improved vaccine to contain pseudorabies disease

Mohd Azmi Mohd Lila, Zeenatul Nazariah Allauddin, Wahid Ali and Aini Ideris

The vaccine, namely JESKYL, was developed by using a local type of herpesvirus originally obtained from a disease outbreak in Malaysia. The vaccine is proven to be useful to contain the disease, namely pseudorabies that mainly affects swine and some other mammals. Without vaccination, an outbreak of the disease may cause a severe loss to the livestock industry.

JESKYL-KH —Pseudorabies Vaccine

Award Winner

UPM has successfully developed the vaccine by using an advance biotechnology approach. The safety and the effectiveness of the vaccine have been assured following the removal of genetic factors that are responsible for development of viral disease. In the process, two important genes have been removed from the virus or inactivated permanently. To ensure the safety of the genetically improved vaccine, the virus used has been grown in an appropriate cell culture continuously and tested in laboratory for more than 5 years. Another important feature of the vaccine is, disease-bearing animals can be easily identified and differentiated from any animal vaccinated with the vaccine. Meaning the

Turn to Page Eight

Editorial

Biotechnology:
for Wealth Creation and Social Well-being

Biotechnology has been identified as a new engine of growth for Malaysia. As often mentioned in the recently concluded BioMalaysia, it is envisioned that biotechnology will be able to improve the quality of life, generate new wealth and income for both rural and urban population and improve the socio-economic status of the people as a whole.

Universiti Putra Malaysia is a significant contributor to the growth and development of S&T whereby our research achievements are being exhibited and recognized at the national and international platforms. The teaching and research in the area of biotechnology has been actively carried out in UPM over several decades with the initial setting up of the Department of Biotechnology in 1986, which was the first in Malaysia. The establishment of the Faculty of Biotechnology and Biomolecular Sciences (FBSB) at UPM on 1 August 2004 reflects the strength and focus of the University in further propagating the development of biotechnology in the country.

Biotechnology is highly multidisciplinary; it has its foundations in many fields including biology, chemistry, genetics, microbiology, biochemistry, molecular biology, and chemical and bioprocess engineering.

Historically, biotechnology could be exemplified as a science in the manufacture of wines, beers, and cheeses, etc. where the techniques of manufacture were well worked out and reproducible but the molecular mechanisms were not understood. With the major advances in our understanding of microbiology and biochemistry, these processes have become better understood and improved.

Modern biotechnology evolves as a result of the birth of recombinant DNA Technology in the early 1970s, this led to the development of a vibrant and effective field known as molecular biotechnology. This new field has made it possible to analyze human genome and that of lower organisms. Using techniques in recombinant DNA technology and gene splicing we can now actually transfer specific genes of interest from one organism to another. As the result of this breakthrough, microorganisms can be used for the production of human biomolecules and also for improving livestock and crops. In addition, the process of fermentation and utilization of giant bioreactors has now been optimized and many more important products have been produced which seemed impossible during the period of traditional and classical biotechnology.

Application of this field cannot be over emphasized. Method of treating patients has moved from treating symptoms of diseases to treating causes of diseases. Some other applications include therapeutic, diagnostics, food industry, environmental protection, biodiversity, and forensic science etc.

Whilst innovation and creativity must be a stronghold in researches related to Biotechnology, quality must never be compromised and the importance of fundamental research must never be ignored.

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Photographs courtesy Ahmad Fua'ad Alwi

Spotlight

The Future of *Agriculture...*

The current effort in capacity building is to promote advancement in biotechnology application in agriculture is certainly in the right direction.

Agriculture is one of the oldest professions ever known to mankind. This is so because agriculture production is a process to generate basic human needs such as foods and other essential raw materials. There was little surplus and if there be access in production; the goods were traded by bartering. This led to the invention of Commercial agriculture. The transformation of agriculture from subsistence farming into an industry was the result of successful introduction of machinery and chemical applications which led to large scale intensive farming operations generating large quantities of products beyond local consumption level. The surplus was distributed to deficit locations and areas. Today with the exception of few nations, agriculture industry continues to flourish in spite of competition from other sectors. In fact, the modern economy grew out of agriculture. Besides foods, many raw materials produced from agriculture are processed into industrial goods. It is very clear that agriculture is not only concerned with food production but also other useful products to support economic development of nations.

Human population continues to rise unabated. Expanding population will result in a concomitant increase in food consumption. Malaysia is a net food importer and is over dependent on foreign producers to overcome the large deficit in domestic food production. Malaysia is comparatively a small country having limited land mass to be cultivated for agriculture. If all the arable land are utilised to the full potential, agricultural production will increase beyond the present level.

Human food is not just energy but also consists of proteins. Of late, the cost of protein particularly of animal origin has risen. Poultry products were among the cheapest source of protein in the market. It is no longer so today. The reason for the large increase in price is due to high production cost of maize, a major ingredient used in poultry feed formulation is in short supply. China, which used to export maize, is importing it instead, causing the price to rise. Another contributing factor is the recent outbreaks of highly pathogenic avian influenza in the south-east Asian countries.

The world has now become a global village where nations trade freely with each other. Trade barriers and protectionism are no longer the order of the day. Goods and services are more readily available in places where the purchasing power is high. Economic growth does not necessarily imply fair and equal distribution of wealth. In any society there is bound to be the less fortunate groups whose survival depends upon inexpensive food and other necessities. The aim in agricultural production is therefore not only to ensure profitability to producers but also to guarantee wholesome food and fair price to customers. This is a difficult task but not impossible provided the industry is efficient and innovative.

Malaysia does not have enough labour force to service the agriculture sector. As a consequent, foreign labour is recruited. Today almost the entire plantations and estates depend on foreign labour. This situation should not go on without risking long term national interest. Therefore, recruiting foreign labour is not the solution. The future of the plantation sector also depends very much on its ability to mechanise various farm operations by adopting new technology. The idea is to ensure sustainability and profitability of the plantation sector. Our plantation sector, if allowed to depend on cheap labour, may at the end lose out its competitiveness to plantations in the neighbouring countries.

The agricultural industry consists of the primary, post-harvest and marketing components. In the past the strength of agriculture was in the primary segment concerning mostly with the upstream activities. As we know upstream activities are usually labour dependent and not value added. In the fast growing economy of Malaysia, upstream activities may no longer be feasible since the cost of labour goes up concomitant with improved standard of living. Malaysia has to determine the priority areas in agriculture so as not to waste the limited resources it has. We are not a large nation and land use should be maximised for production of only essential and high value commodities.

The plantations for example also offer a unique opportunity for livestock to be integrated in the inter-rows. The only limiting factor is that the management in nearly all cases is not well versed with animal husbandry. In fact integrating livestock not only increases profitability but also reduces pollution since chemicals are no longer needed to weed out growth in the inter-rows. A number of by-products especially from the palm oil industry can be utilised as animal feed. These by-products such as empty fruit bunch and oil palm fronds have good nutritive value and after a simple processing regime are readily consumed by ruminants.

Agricultural output could decline unless productivity is improved. The future of agriculture has to be secured in order to ensure adequate food supply for the growing population in a fast moving world where arable land is rapidly being converted to other uses. The future of agriculture would be not only to ensure an increase production but also to improve the distribution systems leading to easy accessibility to food at affordable prices. Malaysia has the potential to expand food production but it needs an effective mechanism that links producers directly to the market place. The idea is to transform the food sector into a growth industry. This is achievable provided we are prepared to *revitalise the agriculture and food industry* to be more responsive to innovations and new initiatives. The current effort in capacity building is to promote advancement in New Biology or biotechnology application in agriculture is certainly in the right direction.

We are in transit from the industrial age to the information age. Unless all agricultural processes are knowledge-driven, it is unlikely that the agricultural industry will emerge strong and resilient. To achieve this target research in agriculture needs to be addressed to solve both short and long term issues in agriculture. In conclusion, agriculture is a vital industry supporting national economic development as well as human existence. Although currently facing crucial constraints, the future prospects are bright because the demand for agricultural produce especially food is expected to grow to cope up with the human population explosion. The agro-industries' competitiveness should be sustained through innovation to ensure profitability over the long-term.

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IBDReal check

Abdul Rahman Omar, Aini Ideris, Mohd Hair Bejo, Hairul Aini Hamzah and Kong Lih Ling

Award Winner

Infectious bursal disease (IBD) also known as Gumboro disease is the second most important poultry disease after Newcastle disease. Economical loses associated with IBD are highly mortality and poor vaccine performances due to immune suppression. Even though, infection with very virulent IBDV associated with distinct pathological lesions, the diagnosis of IBD is complicated due to presence of vaccine-induced immunity. In addition, laboratory detection of field strains of IBDV may facilitate farmers to choose the appropriate vaccines to vaccinate their flocks against very virulent IBDV.

A Sybr Green I Based Real Time PCR Kit for rapid, accurate and low cost detection of IBDV

The current routine method to differentiate very virulent and vaccine strains of IBDV is by restriction fragment length polymorphism of VP2 gene. However, this method is time consuming, prone to error and less sensitive. Hence, development of improved laboratory detection method is essential for effective control of clinical and sub-clinical IBDV outbreaks. Rapid advances have been made in the development of real-time PCR techniques in the detection of avian pathogens. In most of the studies, the detection of viruses was based on real-time PCR assays utilizing probe labeled with TaqMan or FRET technology. Besides fluorescent labeled probe PCR assay, Sybr Green I based real-time PCR assay has been used to detect viruses that affect humans such as dengue viruses and hepatitis viruses. This has also been used to detect genetic polymorphisms or genotyping of genes that are associated with clinical disorders in humans. Studies on the application of Sybr Green I based real-time PCR in differentiating different strains of poultry viruses is lacking.

In this study, it was reported for the first time the use of Sybr Green I based real-time PCR to differentiate different strains of IBDV. The developed assays were optimized using novel set of primers and previously characterized field and vaccine strains of IBDV. Based on the optimized PCR procedures, a signatory threshold value (Ct) and melting temperature (Tm) values were established as the basis for the detection and differentiation of IBDV strains. The optimized PCR procedure has been transformed into a prototype kit, IBDReal check. The performances of the kit are currently been tested and validated using both standard and clinical samples.

The kit has 100 % specificity when compared to other established IBD detection tests including sequencing of the VP2 gene. In addition, the kit detects dual infections ie. vvIBDV and vaccine strains from bursa samples obtained from outbreak cases of IBDV and at least as sensitive as the conventional virus isolation in embryonated eggs.

Furthermore, compared to fluorescent labeled probe based real-time PCR, the developed kit is more rapid, economical and suitable to be used as routine high throughput assay in diagnosing IBDV in chickens.

The kit is Patent-pending under **Malaysian Patent PI 20044610.** RMC

Silver – *International Invention, Innovation, Industrial Design & Technology Invention (ITEX 2005).*
Silver – *UPM Invention & Research Exhibition 2005 (PRPI 2005).*

Reader Enquiry

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Chirazim™ — *a highly enantioselective enzyme*

Abu Bakar Salleh, Siti Salhah Othman, Mahiran Basri, Mohd Zobir Hussein, Mohd. Basyaruddin Abd. Rahman and Raja Noor Zaliha Abdul Rahman

Award Winner

If we face our hand right towards our hand left, we can say that each is the mirror image of the other. Although they look similar they are not exactly the same as they cannot overlap on top of each other. These types of compounds are known as chiral compounds. In nature, we have many such chiral pairs designated as the R and S isomer. Of importance, each member of a chiral pair can exhibit different biological properties. The differential effect is caused by the presence of enzymes (biocatalysts) in living cells that are able to recognize and thus react with specific compounds (i.e. even either member of a chiral pair). The ability to synthesis specific compounds in the pure is very much sought after by the chemical industry. Pure isomer has specific applications in medical and agrichemical industry. Mixed products may diminish the effect required, or worse still may lead to detrimental results. Specific examples of isomer in industrial applications include S-ibuprofen, an analgesic agent, R- chlorophenoxy propanoate, a type of herbicide, and a number of R menthol esters that are used as flavour additives in the food and beverage industry.

However, not all enzymes have capacity to resolve enantiomers. The ability to recognize each compound depends a lot on the shape and conformation of the enzyme molecules, especially that of the active or catalytic site. One way of modifying the conformation of the enzyme is through the process of immobilization, where an enzyme is attached to a solid support. There are different types of supports and techniques to immobilize enzymes. These are selected in accordance to the property of the enzymes as well as the ultimate applications. Immobilized enzymes are easy to handle and can be reused. Chirazim™ is a new discovery where lipase, the enzyme was immobilized onto a support via a simple method. The support used is a multi layered hydroxide that can also be easily produced. Immobilization resulted in a derivatised enzyme that shows high capacity to resolve S and R isomers. Apart from that the immobilized enzyme is stable to organic solvents and high temperature, suitable characteristics in the synthesis of chiral compounds. RMC

GOLD – *International Exhibition of Inventions, New Techniques & Products (Palexpo-Geneva 2005).*

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Bile Salt Hydrolase (BSH) from Probiotic *Bifidobacterium longum* for Hypercholesterolemia

Mohd Yazid Abdul Manap, Shuhaimi Mustafa, Abd Manaf Ali and Norihan Saleh

Award Winner

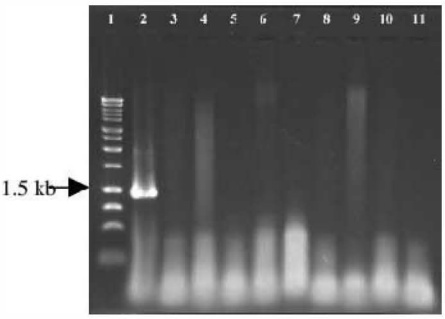

Fig. 1: PCR amplification of BSH gene from Bifidobacterium longum BB536. Lanes: 1, 1 kb DNA ladder; 2, Bifidobacterium longum BB 536; 3, B. pseudocatenulatum JCM 1200; 4, B. pseudocatenulatum F34; 5, B. infantis ATCC 25962; 6, B. infantis ATCC 15697; 7, B. animalis ATCC 27672; 8, Streptococcus faecalis T-110; 9, Bacillus mesentricus TO-A; 10, Lactobacillus rhamnosus GG ATCC 53103; 11, negative control (without template DNA)

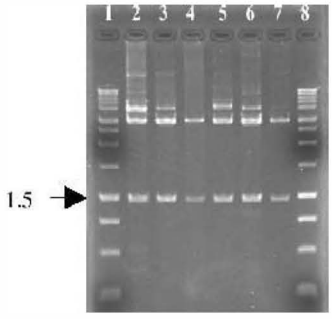

Fig. 2: Plasmids digestion of white colonies cultures with EcoR1 at 37oC for 4 hours. Lanes: 1, 1 kb DNA ladder; 2, colony 1; 3, colony 2; 4, colony 3; 5, colony 4; 6, colony 5; 7, colony 6; and 8, 1 kbp DNA ladder. All the 6 colonies isolated harboured inserted DNA with the size of approximately 970 bp.

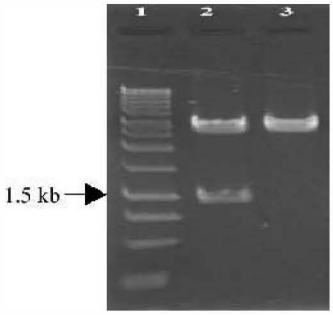

Fig. 3: Restriction enzyme analysis of the transformant showed that the bsh gene from B. longum was successfully cloned into pRSET A expression vector and transformed into E. coli BL 21-SI. (Double digestion with EcoR1 and BamH1, Lane 1: 1 kb DNA ladder; lane 2: vector plus insert; lane 3: vector without insert)

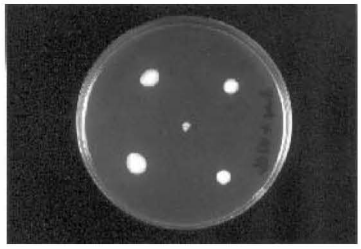

Fig. 4: Manifestation of BSH activity by E. coli transformants on solid medium containing 0.5% (w/v) TDCA. The E. coli colony in the centre is the strain without bsh gene. The four colonies surrounded with halos of precipitated DCA are transformants E. coli carrying bsh gene.

Hypercholesterolemia, or high cholesterol is a high level of cholesterol in the blood that can cause plaque to from and accumulate leading to blockages in the arteries (atherosclerosis), increasing the risk for heart attack, stroke, circulation problems and subsequently a death. However, cholesterol is vital precursor for the synthesis of conjugated bile salts that are needed to help in lipid digestion. After being used to digest lipid, conjugated bile salts will be reabsorbed into the liver through the enterohepatic pathway. Thus, the only way to reduce serum cholesterol is by preventing the re-absorption of bile salts through deconjugation process and increase the use of cholesterol from blood to produce new bile salts.

A pair of PCR primers for the rapid detection of bile salt hydrolase *(BSH)* gene from *Bifidobacterium longum* BB536 has been synthesised and have revealed the *BSH* gene of approx 970 bp in *Bifidobacterium longum* BB 536 but not in other species of bacteria tested. The *BSH* gene was cloned and sequenced showing a high similarity to *BSH* gene previously published. The resulting nucleotide sequence encodes a predicted protein of 317 amino acids, Mw = 35 kDa. The *BSH* gene from *B. longum* was also cloned and expressed in *E. coli* BL21-SI using pRSET-A expression vector. The over-expression was detected using direct plate assay and immunoblotting.

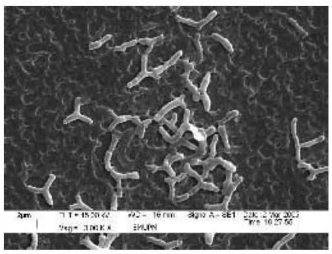

Fig. 5: Morphology of B. longum as observed under scanning electron microscope

Bronze – *Expo Science, Innovation & Technology (Expo S&T 2004)*
GOLD – *UPM Invention and Research Exhibition 2002 (PRP 2002)*
Bronze – *Expo Science & Technology (Expo S&T 2002)*

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Pullulanase Type II from a Locally Isolated Bacterium, *Bacillus* spp H1.5

Arbakariya B. Ariff, Hii Siew Ling, Ling Tau Chuan and Rosfarizan Mohamad

Pullulanase (EC 3.2.1.41, pullulan 6-glucanohydrolase), which was first reported in *Aerobacter aerogenes* splits the α-1,6-glucosidic linkages in pullulan and gave rise finally to maltotriose. As this enzyme can debranch amylopectin, it is used to increase the efficiency of starch saccharification process.

Pullulanase can be used with saccharifying a-amylase or glucoamylase for high glucose syrups or with β-amylase for high maltose syrup production, where the main functions are to increase yield and decrease the reaction time. Different methods (starch agar, phenol red agar, pullulan agar and red-pullulan agar) have been used to screen and to isolate the pullulanase-producing-bacterium from various sources.

The red-pullulan agar method was found to be the most efficient and can be used for a direct isolation and detection of pullulanase-producing bacteria. Using this technique, extracellular-pullulanase-producer, *Bacillus* spp H1.5, was isolated which is capable to produce pullulanase during growth on gelatinized starch and pullulan. The partially purified enzyme showed optimal activity at 55°C, and pH 6.0. The thermo stability and the thermo activity of the pullulanase enzyme were considerably increased in the presence of Ca^{2+}.

Culture broth of Bacillus spp H1.5 during growth in Sago Starch for pullulanase production

The enzyme was able to attack specifically the α-1,6-linkages in pullulan to generate maltotriose as the major end product, as well as the α-1,4-linkages in amylopectin and soluble starch leading to the formation of a mixture of maltose and glucose, and therefore it can be classified as a type II pullulanase or an amylopullulanase.

Pullulanase fermentation by a local isolate in batch stirred tank fermenter

Reader Enquiry

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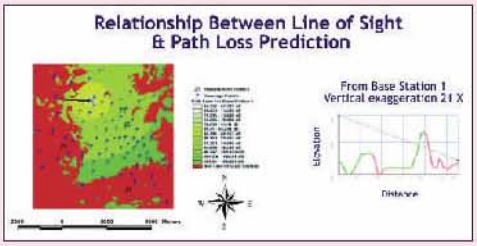
UPM Radiowave Planner and Predictor (RPP):

A GIS Based Cell Phone Signal Strength Predictor

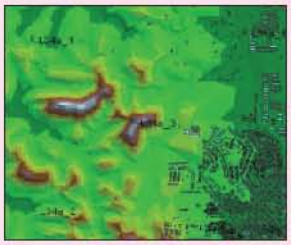
Abdul Rashid Mohamed Shariff, Khoo Yuen Hing, Abdul Razak Abdul Rahim, Ashraf Gasim Elsid Abdalla, Radzali Mispan, Shattri Mansor and Noordin Ahmad

AwardWinner

This research deals with the prediction of cell phone radiowave signal strengths at different geographical locations. It is a multidisciplinary research that integrates the radiowave models and mathematical equations from the computer communication discipline, with the terrain mapping and GIS capabilities, GPS location determination and remote sensing base data updating from the Spatial Information engineering discipline.



Modelling of radiowaves was carried out using the Hata, COST231 Hata and the CCIR models. These models were later used to create a GIS based simulation package that took the mathematical equations from these models and tested them against digital spatial data that was fed into the UPM Radiowave Planner and Predictor (RPP) application software. The RPP application software was developed using the ArcView GIS as a base and the digital spatial data was obtained from Jabatan Ukur dan Pemetaan Malaysia (JUPEM). RPP major capability is the prediction of median propagation loss between antennas.



User can dynamically choose a transmitter and observe the signal interference effects from other transmitter stations

In order to validate the capability of RPP, an actual field survey was undertaken to map the signal strength of the 5 major cellular carriers in this country. Signals from these 5 carriers were recorded at various points and the GPS coordinates of these points were measured for creating a spatial representation of the signals. Using spatial extrapolation techniques, radiowave signal intensity maps were produced from these observations. These maps correlated well with the predictions made by the RPP application software, thus validating the theoretical model and verifying the application software that has been developed. This research has resulted in the development of a radiowave intensity prediction software. This application software will be of immense help to the planning and optimizing of the setting up of new transmitter stations as the cell phone carriers try to reach out a greater population of the country. These carriers can also use RPP to identify areas where their clients are not getting good coverage thus enabling for the planning of better services.

Major features of the RPP

1. Ability to model radiowaves using the Hata, COS231 Hata, and the CCIR models;
2. Ability to integrate radiowave models with the Malaysian Spatial Model and implement its execution;
3. Ability to predict the median propagation loss between antennas;
4. Ability to determine the best position for the placement of transmitters, having the least interference effect; and
5. Potential to include demographic studies of customer base.

GOLD – *International Exhibition of Inventions, New Techniques & Products (Palexpo-Geneva 2005).*
Bronze – *Expo Science, Innovation & Technology (Expo S&T 2004).*
Silver – *UPM Invention & Research Exhibition and Awards 2003 (PRP 2003).*

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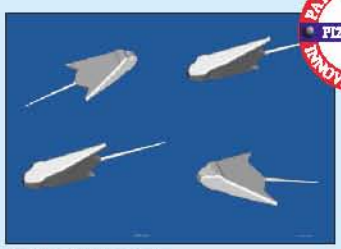
PARI-Z — Underwater Unmanned Vehicle for *Maritime Intelligent/Surveillance*

Abdul Rahman Ramli and Mohamad Zain bin Mohamad Yusof

PARI-Z is an underwater unmanned vehicle, defined as a self-propelled submersible whose operation is either fully autonomous or under minimal supervisory control.

Its primary mission is to collect various intelligent data across the entire spectrum while re-maining undetected having modular platform approach whereby other types of sensor could be deployed for additional data collection.



PARI-Z: Prototype design

The vehicle will specifically extend the reach into denied areas, and enabling missions in wa-ter to deep or shallow and hazardous for conventional platforms, with the objective to collect various intelligent data. It will adapt itself to the environment with the built-in intelligent systems while collecting data to avoid any threats or difficulties. Information collected will be transmitted back to the host platform (either in real-time or batch). At time where absolute detection avoidance is required from the effect of the communication systems, the vehicle may be in simple mode where data will be recorded and sent back to the control station or transmit from an appropriate area close to the control station.

The project was an initiative by Hitech Macro Sdn. Bhd.

PARI project is still in Research and Development phase located at Institute of Advanced Technology, UPM. This R&D is being commercialized through a company with the help of IGS grant supported by MOSTI. The company hopes to commercialize and contract out the final prototype upon completion by end of 2005.

Some of PARI capabilities including pre-programmed full autonomous or remotely operated mode, underwater data collection, i.e. telemetry information, imaging information, ocean currents velocity and status measurements, vehicle velocity over ground measurements, bottom-track velocity and status, vehicle compass / tilt data, coordinate mapping, barriers avoidance forward / downwards sonar, wireless underwater communication with 2-5km ra-dius and 100 meters in depth. It has a weight of approximately 30 kilograms and could be operated within 24 hours mission hours using rechargeable power supply.

Request of interests on the vehicle already started and targeted agencies are from Govern-ment agencies, i.e. Department of Environment, SMART, Fisheries Department, etc., while private sectors mainly from the Oil and Gas Industries before moving forward to international market by end of 2006.

Some of the key factors of the project are enhancement via R&D to achieve new potential technology and acquire components-off-the-shelf for economical approach, as a kick-start for the overall project engagement. Furthermore, systems and solutions integration of PARI back-end software algorithm to existing customer database plays an important role for data sharing reliability and modular concept of design for straightforward enhancement. Finally, trouble-free enhancement is essential for additional payload mounting as an add-on is based-on capabilities and requirements as the payload need increases. PARI Project is open for any collaboration and could be reached at www.pariproject.org. This R&D is Patent-pending under **Malaysian Patent PI20041671.**

Reader Enquiry

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ResearchHappenings

Visit of the Honorable Minister of Plantation Industries and Commodities, YB. Datuk Peter Chin Fah Kui *(26 May 2005)*

WARM WELCOME: YB. Datuk Peter Chin Fah Kui, Minister of Plantation Industries and Commodities and Mrs. Fatimah Raya Nasron, Deputy Secretary-General 1 on their arrival at UPM

R&D ACTIVITIES GALORE: Dr. Jalaluddin showcasing R&D work on *Kenaf* at UPM to the minister while Dato' Zohadie (centre) and Y. Bhg. Tan Sri Datuk Dr. Yusof Basiron look on

HUGE POTENTIAL: Talking to the media, the Minister assures a cordial relation between his ministry and UPM with UPM vice-chancellor, Dato' Zohadie Bardaie and MPOB director-general, Y. Bhg. Tan Sri Datuk Dr. Yusof Basiron

PRIORITY RESEARCH: Prof. Mazlah highlighting her research on medicinal plants to the minister while Prof. Zulkifli (extreme right) looks on

ETHICAL MANNER: Prof.Zulkifli discussing with Dr. Nor Arfqih, Dr. Reha (left) and Mr.Nayan (right)

VIP VISITORS: *(from left)* Mrs. Fatimah Raya, YB. Datuk Peter Chin Fah Kui, Y. Bhg. Tan Sri Datuk Dr. Yusof Basiron and Dato' Zohadie Bardaie

16th International Invention, Innovation, Industrial Design & Technology Invention (I-TEX 2005), PWTC, KL *(19-21 May 2005)*

HONOURED: On behalf of UPM, Research Management Centre receives the *"Best Booth Design"* from the MINDS representative

HAPPY MOMENT: Muhammad Rezal Kamal Ariffin *(right)* with his co researcher received a GOLD Medal & a Special Award from National United University, Taiwan

JUBILATION: RMC Director, Prof. Zulkifli with the *Best Booth Design* award

ALL SMILES: Dr. Mohd. Hair Bejo from Veterinary Medicine received a GOLD Medal award from a representative of MINDS

RECOGNITION OF CONTRIBUTION: Tan Sri Datuk Dr. Augustine S.H. Ong, President, MINDS presenting a Gold Medal Award to Dr. Mohamad Pauzi Zakaria *(left)* from the Faculty of Environmental Studies

ONE FOR THE ALBUM: *(from left)* Bronze Medal winners Prof. Abu Bakar Salleh, Prof. Mahran Basri, Assoc.Prof. Raja Noor Zaliha and co researcher Syarul Nataqain Baharum

QUALITY PRODUCT: Assoc.Prof Abdul Rahman Omar from Veterinary Medicine won a Silver Medal for his IBDReal Check detection kit

Invention, Research and Innovation 2005 (PRPI2005) *(13 May 2005)*

TIES THAT BIND: MOSTI Parliament Secretary, YB. Prof. Datuk Dr. Mohd. Ruddin Abdul Ghani representing the Minister of Science, Technology and Innovation on his arrival at UPM with Dato' Zohadie Bardaie, Prof. Zulkifli and Prof. Borhanuddin Mohd Ali *(extreme right)*

KEEN INTEREST: YB. Prof. Datuk Dr. Mohd. Ruddin *(extreme right)* with Prof. Zulkifli Shamsuddin, Dato' Zohadie Bardaie and Prof. Mazlah Mahmood

RESEARCH WORK WELL RECOGNISED: *(from left)* Prof. Zulkifli Idrus, Director RMC, Dato' Zohadie, Vice-Chancellor, YB. Prof. Datuk Dr. Mohd. Ruddin, MOSTI Parliament Secretary and Prof. Dr. Nik Mustapha Raja Abdullah, Deputy Vice-Chancellor (Development)

AWARD WINNERS: *(from left)* are Ahmad Fauzi Puasa, Assoc Prof. Waleed Thanoon, Rohana, Prof. Khalid Abdul Rahim and Assoc. Prof. Awang Noor Abd Ghani

HARD WORK BUT TERRIFIC REWARD: Prof. Abdul Halim Shaari from Faculty of Science receives a GOLD Medal

RAISING PROFILE: Assoc Prof Rita Muhamad Awang receives a GOLD Medal for her well recognized R&D work

DEDICATION: Prof. Zulkifli Idrus, Director RMC receiving a GOLD Medal for his accredited scientific work on Poultry

EXULTATION: Mrs. Naimah Salleh from Faculty of Human Ecology received the prestigious INPEX Award of Excellence for her R&D on Banana fiber

CAPTION: A Token of Appreciation for YB. Prof. Datuk Dr. Mohd. Ruddin Abdul Ghani from UPM Vice-Chancellor, Dato' Zohadie with RMC Director, Prof. Zulkifli *(partly hidden)*

2nd Asia Pacific Natural Products Expo (NATPRO 2005), PWTC, Kuala Lumpur *(14– 16 Apr. 2005)*

PRODUCING A PROGRESSIVE SOCIETY: UPM participates in, and organizes several R&D exhibitions nationally and internationally

EXCHANGING VIEWS: Minister of Science, Technology and Innovation, YB. Dato' Sri Jamaludin bin Dato' Mohd. Jarjis being briefed by Assoc. Prof Maznah Ismail, Director, Interim Institute of Pharmaceutical and Nutraceutical Biotechnology, UPM

HOLISTIC MODEL: UPM's R&D exhibits at Malaysia's leading herbal and natural products exhibition, NATPRO 2005

International Exhibition of Inventions, New Techniques & Products, Palexpo 2005 (Geneva, Switzerland) *(6–10 Apr. 2005)*

R&D FOCUS: UPM treats research as an investment in innovation — UPM's team of vibrant scientists at Geneva

READY TO GO: Dr. Jalaluddin and Assoc. Prof. Fatimah Abdullah with their impressive R&D display of R&D exhibits at PALEXPO-Geneva

INTERNATIONAL RECOGNITION: Assoc. Prof. Abdul Rashid Mohamed Shariff with Governor of Geneva *(left)* after wining a GOLD Medal on his Research on *GIS based cell phone signal strength predictor*

COMING TOGETHER: Ambassador and Permanent Representative of Malaysia to United Nations, Geneva, H.E. Dato' Mrs Hsu King Bee with Prof. Dato' Kamel Ariffin Mohd. Atan *(left)* and Assoc. Prof. Ishak Aris *(right)*

PUTTING UPM ON GLOBAL MAP: Assoc. Prof. Arfah Salleh winner of TWO GOLD Medals chatting with H.E. Dato' Mrs Hsu King Bee while Prof. Dato' Kamel Ariffin smiles

ASSESSMENT: Prof. Rustem Sunchelsey co researcher of Prof. Dato' Kamel Ariffin with the Judges

GREAT STRIDES: Prof. Mahran Basri showcasing her R&D exhibit to the Judges

TOWARDS PROGRESS: Assoc. Prof. Ishak Aris with the organizer at PALEXPO-Geneva

LEADING IN INNOVATION: UPM's all 13-member team brought back prestigious medals from Geneva

Banana Fibers as By Product of Agro Waste:
Raw Source of Material for Textile and Handicrafts

Award Winner

Naimah Mohd Salleh and Aziah Hashim

Banana fibers have the potential to be developed into textile and handicrafts. Banana fibers based products have unique properties and could be used as a symbol of Malaysian craftsmanship. The objective of this study is to identify the best method in producing the fibers, determine the properties of the fibers and its suitability for textile and crafts. Initial preparation process was conducted in the laboratory using two methods. The methods include: (i) A mechanical process for decortication using a specially built press machine. (ii) A chemical process using pectin as a catalyst in a retting process. After determining the mechanical methods as the more efficient method in producing the fibers, the technology was implemented at the cottage industry level. The properties of the fibers were determined in the laboratory. Various standard test methods and dyeing procedures were used to determine the physical and chemical properties of the fibers. The physical structures of the fibers were studied using Scanning Electron Microscope and other properties such as tensile strength and lustre were also determined. In developing products, the fiber were spun and twisted into yarn form. The yarns were then woven into fabric form. Other methods include stripping the stem, pressing the thin strips and drying them before weaving them into s heets and handcrafting them into various form. The fibers were dyed to provide variations and aesthetic. Results show that banana fibers have good tensile strength, lustre, spin able, high heat resistance and absorb dye quite easily. Products developed include bags, picture frames, lampshades, tissue boxes and textured textiles. Implications of the study include its suitability for production as textile and crafts and can be developed as a by product which could have added value for agro-waste in the rural areas. This is in line with the rural development programmed by the government. The production of these banana fibers based products could provide economic activities among crafts and textile producers, and banana plant growers.

Banana stem

Banana fibres

Banana products

GOLD – *UPM Invention and Research Exhibition 2005 (PRPI 2005)*
Special Prize – *INPEX Award of Excellence 2005.*

Reader Enquiry

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JESKYL - disease-bearing animals can be easily identified .....

From Page One

vaccine contains two genetic markers that can easily be identified by one of two common laboratory tests: DNA testing or antibody testing. This approach has enabled anyone with skill-in-the-art to rapidly identify infected animals. This approach shall help farmers to remove or slaughter infected animals and finally achieve an endorsement of pseudorabies disease-free livestock farm. Such disease-free status has been achieved in certain countries and the recognition is important for export purposes.

The technology used for the development of the vaccine has been subjected to patent application. Despite these advantages, as the vaccine will be produced using local resources, the price of the vaccine is expected to be cheaper than those imports.

Commercialisation of the vaccine is taken care by Malaysian Vaccines and Pharmaceuticals (MVP) Sdn Bhd. Commercialisation of vaccine is a complex and well-regulated process, and monitored by a well-respected authority in Malaysia. UPM and MVP have taken an appropriate measure to ensure the safety and efficacy of the vaccine. MVP is manufacturing an appropriate amount of the vaccine, using GMP manufacturing facilities, for the purpose of field trials in animals. The company intended to manufacture two forms of vaccines using live or killed virus. This strategy is to capture both the existing market for killed-virus vaccine and the growing demand for the live-virus vaccine. Obviously, based on annual import and number of animal farms, the current market size of the vaccine in Malaysia is expected to be about RM1 million per annum. Since MVP is the only vaccine manufacturer in Malaysia, it is believed that the company may capture the majority of the market share plus some percentage of more than RM20 million-worth per annum vaccine market in Asia.

Inactivated Oil Adjuvanted Vaccine—TK and gE gene-deleted virus

GOLD – *Expo Science and Technology (Expo S&T 2002).*
GOLD – *UPM Invention & Research Exhibition 2002.*

Reader Enquiry

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The ...Sweet... Sweet... herb of the decade[1]

Stevia rebaudiana (madhu patra) .....

Award Winner

Background

Stevia rebaudiana is native to Brazil, Venezuela, Colombia and Paraguay where the native Guarani Indians have used *caa-ehe (Stevia)* for over 1500 years to sweeten otherwise unpalatable medicinal drinks, teas, herbal extracts etc. In 1887, *Stevia* was discovered by Antonio Bertoni a South American botanist who learned of the herb from the Guarani Paraguayan Indians, who locally knew it as *Caa'-ehe* or *Kaa'-he-e* which means "sweet herb" or "honeyleaf". Bridel and Lavieille, two french chemists began to unravel the secret of *Stevia* in 1931 with exploratory extraction on *Stevia Rebaudiana* leaves. Their research yielded a pure, white crystalline compound they named "stevioside" which was found to be 300 times sweeter than table sugar without toxic effects in laboratory animals.

Close up of Stevia plant

Stevia nursery

Stevia, commonly know a honey leaf in English and recently coined as *Madhu Patra* in Sanskrit by ASR GROUP for the Indian market is not any more a new unheard plant in India. Internet search engines throw up over 3,00,000 websites on *Stevia*, talking about the history, uses, products, properties, cultivation etc. This abundance of information on the internet reflects the commercial potential of *Stevia* and the public interest in this plant and plant based products.

Cultivation & Botany

Stevia was tested for cultivation in India since the early 90's, but the commercial breeding, multiplication and cultivation of *Stevia* started in 1997 mainly in Bangalore followed by companies in Tamil Nadu and is now fast spreading among farmers in other states of India such as Kerala, Andhra, Maharashtra, Gujarat, Assam and Himachal. Breeding programs in *Stevia* are to optimise the glycoside content and sensory characteristics, disease resistance, leaf yields and leaf-to-stem ratio. Like any other plant the soil, water and climatic conditions influence the crop greatly, which can be influenced marginally with management practices. It is a short day plant, growing up to 0.6 meters in the wild and flowers under short day conditions. *Stevia* grows well on fertile, sandy acid soils with shallow water tables under natural climatic conditions of semi-humid subtropical with temperature extremes from 21 to 43 C, averaging 24 C.

Stevia field beds at different stages

Properties of *Stevia*

The di-terpene glycosides (7 of them in total) of which stevioside and rebaudioside are the most dominant ones, are stable in a wide range of Ph. Steviosides are stable up to a 180°C, while rebaudiosides are stable upto a 100°C. Rebaudiosides are preferred for carbonated beverage and chilled foods, while steviosides are preferable for baked and cooked products.

Hypoglycaemic action: Paraguayans believe that *Stevia* is hypoglycemic and aids the diabetic by influencing the pancreas to restore normal pancreatic function. Oviedo, *et al*, reported a 35.2% fall in normal blood sugar levels 6-8 hours following the ingestion of a *Stevia* leaf extract. Other workers have reported similar trends in humans and experimental animals. Based on scientific validation physicians in Paraguay prescribe *Stevia* in the treatment of diabetes and similarly, in Brazil. However, it is important to note that *Stevia* does not lower blood glucose levels in normal subjects. It is an excellent calorie free herbal sweetener.

Cardiovascular Action: A good deal of experimental work done on the effects of *Stevia*and stevioside on cardiovascular functioning in man and animals like possible toxicity and possible therapeutic action. No significant properties were found in both types of study. The most curious finding is a dose dependent action on heartbeat, with a slight increase appearing at lower doses, changing to a mild decrease at higher doses. In both instance the results were remarkable, and it is extremely doubtful that humans would experience any effect at normal doses. The long-term use of *Stevia* would probably have a cardiotonic action, that is, would help in mild strengthening of the heart and vascular system.

Antimicrobial Action: *Stevia* can inhibit the growth and reproduction of bacteria and other infectious organisms. Research clearly shows that *Streptococcus mutans*, *Pseudomonas aeruginos*, *Proteus vulgaris* and other microbes cannot survive in the presence of *Stevia* constituents. This fact, in association with the sweet taste, makes *Stevia* an excellent ingredient for mouthwashes and toothpastes. Stevia has even been shown to lower the incidence of dental caries.

Digestive Tonic Action: Brazilian literature ranks *Stevia* high among the list of plants used for centuries by the "gauchos" of the southern plains to sweeten the bitter medicinal preparations. Through much experimentation, these people identified that *Stevia* improved digestion, and that it actually influenced overall gastrointestinal function. Similarly, the Chinese use *Stevia* in teas hot or cold, as an appetite stimulant, digestive aid, aid to weight management, etc.

Effects on the Skin: A property of *Stevia* yet to be clinically validated is its ability to aid solving of skin problems. The Guarani and other people familiar with *Stevia* report its effect on acne, seborrhea, dermatitis, eczema, etc. *Stevia* placed directly in cuts and wounds resulted in more rapid healing, without scarring, is observed. *Stevia* face packs have also been found to be very effective in tightening of the skin, as a result a few leading brands of *Stevia*-anti-wrinkle face packs are available internationally.

Safety Information Regarding Stevia

The best piece of information on *Stevia* is the fact that for over 1500 years of continuous use by Paraguayans, there is no ill effect reported to date. Similarly for over a decade Japanese have been ingesting stevioside based products and not a single report of side effects of any kind has been reported. Pomaret and co-workers in South America performed the first official investigation of possible toxicity from *Stevia* in 1931. Their tests were negative. They observed that stevioside passes through the human alimentary canal without being altered by digestive processes. That is, it goes out in exactly the same form that it goes in. In the decades since that observation there has raged a minor debate over this issue, but so far nobody has been able to prove Pomaret wrong. An example of a good toxicology trial was one performed in 1985 by Yamada and co-workers. They administered stevioside and rebaudioside A to rats for two years at the rate of 0.3 - 1% of their diet. The animals were then sacrificed, and the researchers conducted bio-chemical, anatomic, pathological and carcinogenic tests on 41 organs following autopsy. In addition they performed ongoing hematologic and urine tests on the same animals. Each of the animals was matched to a control animal that experienced exactly the same treatment except for the *Stevia* and no ill effects were observed between them. Similar batteries of tests carried out by the National Ministry of Health and Welfare in Japan also failed to find any form of toxicity.

Availability of *Stevia*

Stevia rebaudiana is currently available in India in the form of dried green leaf, leaf powder, liquid extract and spray dried whole leaf extract. In addition to theses basic forms, *Stevia* is also available as value added products like *Stevia* tea, Stevia face pack, *Stevia* health drink, *Stevia* Sweet *supari*, *Stevia* biscuits, *Stevia* toothpaste, *Stevia* chocolates etc. The first commercial brand of *Stevia* and currently the only one with PFA license is called as STEVIER from ASR Herbals. *Stevia* is sold in the US with FDA approval as a dietary supplement.

Stevia dietary supplements

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[1] *The writer, Dr. Seetharam Annadana is the technical director with AgriGrowMore (M) Sdn. Bhd. He is also a partner of ASR Nurseries & Herbals, India's first company dedicated to the promotion of Stevia in India since 1997. ASR Group provides consultancy, planting material, basic products from Stevia and value added products from Stevia. He can be contacted at stevier@asrherbals.com, via tel: 603-2691 4013/ 019 217 6474, or fax at 603-2694 1796.*

Seetharam Annadana graduated with a M.Sc with distinction from Wageningen University, Netherlands in 1997. He then obtained his Ph.D. also from the Wageningen University, Netherlands.

He has over 10 years of experience in R&D in the Biotech sector and has extensive skills in providing technical consultancy for Agri Horti projects. Seetharam has successfully executed several projects related to biotech and plant genomics etc. He has been a freelance consultant and representative of a number of Indian seed and international companies.

In addition, Seetharam has published many scientific technical papers and holds professional memberships of various bodies.

NewsBriefs

Hitting the Mark

I am very pleased to announce that *Synthesis* is now into its second year of publication with its circulation surpass 4,000 nationwide.

Effective June, the makeover issue of *Synthesis* will capture your imagination with its content and attention-grabbing size and layout. I also take this opportunity to sincerely acknowledge with thanks the numerous letters from our readers that have been piling up in the last few months, congratulating our editors. I am very pleased to say that you find the articles informative, useful and well written. I am also glad to note that many of our readers find our articles succinctly yet instructive. Thank you to one and all that have made *Synthesis* a success. We sincerely hope to keep up the good work and look forward to see yet another climb in the readership of *Synthesis*.

Synthesis is the official research bulletin of the University and is published by Research Management Centre quarterly. It is available free of charge to the academic community.

(Turn to back page for a glance at Synthesis' back issues.)

Visit of Plantation Industries and Commodities Minister to UPM

YB Datuk Peter Chin Fah Kui, Honourable Minister of Plantation Industries and Commodities, Malaysia and his delegates including Mrs. Fatimah Raya Nasron, Deputy Secretary General 1 along with other high officials from the ministry visited UPM on 26 May 2005. His visit was organised by Research Management Centre (RMC), UPM to particularly highlight UPM's multidisciplinary research in the plantations and commodities sector, and further boost intellectual discourse on campus.

A total of about 27 R&D exhibits from various faculties and institutes across the university including "R&D on Kenaf, A New Source of Growth" were displayed in a mini exhibition held at the IDEAL complex, UPM from 9am to midday. The event was officiated by UPM's Vice-Chancellor, Professor Dato' Mohd. Zohadie Bardaie, Deputy Vice-Chancellor (Development), Professor Dr. Nik Mustapha Raja Abdullah, and Director, Research Management Centre, Professor Dr. Zulkifli Idrus. The event began with a keynote address by Professor Dato' Zohadie.

The Minister showed keen interest in UPM's R&D contributions particularly in the plantation and commodities sector highlighted in a commemorative book that was specially published in conjunction with the his visit. He was also very pleased to see the establishment of the Rainforest Academy at UPM, and the work carried on by it in promoting the awareness of forest plantation industry and rainforest knowledge. In his concluding remarks, the minister assured a cordial relation between his ministry and UPM to boost and ensure success in R&D especially in utilizing on and conservation of our forest resources, recognising the vital role of forests, not only for the production of timber and other forest products, but also for the conservation of soil, water and biological diversity, and the protection of the environment.

(Turn to centre page for pictorial news.)

UPM Researchers set stage for excellence

Invention & New Product Exposition (INPEX 2005)

It was a proud moment for Universiti Putra Malaysia when two of its scientists from the Engineering faculty won Awards of Merit comprising Gold medals at the INPEX 2005 held at Pittsburgh, USA from 8-11 June 2005. Professor Mohd Amin Mohd Soom won the award for his research entitled *Rifeild*, and Dr. Zairil Zaludin won the award for his research on *Emergency Control Revert System for UAV/RPV*.

16th International Invention, Innovation, Industrial Design & Technology Invention (ITEX 2005)

The I-TEX 2005 added another feather on to the UPM's hat when almost all 34 of its scientists who exhibited various technology-driven products at the 3-days event held from May 19-21 at the Putra World Trade Centre Exhibition Hall, Kuala Lumpur were conferred 33 medals in different categories of Gold, Silver and Bronze. In addition, UPM received the *"Best Booth Design"* award in the open space category.

Muhammad Razal Kamel Ariffin and his research team from the Faculty of Science won a Gold medal, and a Special award from National United University, Taiwan for their research on *"Super Secured Messaging System 500 or SSMS500"*.

Assoc. Prof. Dr. Mohamad Pauzi Zakaria from the Faculty of Environmental Studies and Assoc. Prof. Dr. Mohd. Hair Bejo from the Veterinary Medicine received GOLD medals for their innovative research entitled *"A Novel Method [HC MadeEZ] to Determine Hydrocarbon Pollution from Landfill Leachates"*, and *"Double Antibody Sandwich Enzyme Linked Immunosorbent Assay Kit for Infectious Bursal Disease"* respectively.

Recipients of Silver and Bronze medals are given below:

	Medal	Award Recipient
1.	*Silver*	Abdul Rahman Omar (Assoc. Prof. Dr.) — *Veterinary*
2.	*Silver*	Amin Ismail (Assoc. Prof. Dr.) — Medicine
3.	*Silver*	Azizi Hamzah (Prof. Dr.) — Educational Studies
4.	*Silver*	Ishak Aris (Assoc. Prof. Dr.) — Engineering
5.	*Silver*	Kamaruzaman Sijam (Assoc. Prof. Dr.) — Agriculture
6.	*Silver*	Mohd. Amin Mohd. Soom (Prof. Dr.)— Engineering
7.	*Silver*	Norhisam Misron (Dr.) — Engineering
8.	*Silver*	Rusli Hj. Abdullah (Assoc. Prof. Dr.) — Computer Science
9.	*Silver*	Suhaila Mohamad (Prof. Dr.) — Food Science
10.	*Silver*	Thamer Ahmed Mohammed (Assoc. Prof. Dr.) — *Engineering*
11.	*Silver*	Waleed A. Thanoon (Assoc. Prof. Dr.) — *Engineering*
12.	*Silver*	Zairil Azhar Bin Zaludin @ Asmara (Dr.) — *Engineering*
13.	*Silver*	Zulkifly Abbas (Dr.) — *INSPEM*
14.	*Bronze*	Abdul Halim Shaari (Prof. Dr.) — *Science*
15.	*Bronze*	Ahmad Farouk Musa (Dr.) — Medicine
16.	*Bronze*	Anuar Kassim (Prof. Dr.) — *Science*
17.	*Bronze*	Borhanuddin Mohd Ali (Prof. Dr.) — *Engineering*
18.	*Bronze*	Elsadig Mahdi Ahmed Saad (Dr.) — *Engineering*
19.	*Bronze*	Lim Che Klong — *Engineering*
20.	*Bronze*	Megat Johari Megat Mohd. Noor (Assoc. Prof. Dr.) — *Engineering*
21.	*Bronze*	Mohamed Daud (Prof. Dr.) — *Engineering*
22.	*Bronze*	Mohd. Khazani Abdullah (Assoc. Prof. Dr.) — *Engineering*
23.	*Bronze*	Naimah Mohd Salleh (Mrs.) — *Human Ecology*
24.	*Bronze*	Norman Mariun (Assoc. Prof. Dr.) — *Engineering*
25.	*Bronze*	Raja Noor Zaliha Raja Abd. Rahman (Assoc. Prof. Dr.) — *Biotech*
26.	*Bronze*	Sidek Hj. Ab. Aziz (Assoc. Prof. Dr.) — *Science*
27.	*Bronze*	Wong Shaw Voon (Assoc. Prof. Dr.) — *Engineering*
28.	*Bronze*	Zainal Abidin Mohamed (Prof. Dr.) — *Economics*

International Exhibition of Inventions, New Techniques & Products (Palempo 2005)

UPM continued to make great strides in the international arena as well. All of our 13 contestants who participated in the International Exhibition of Inventions New Techniques and Products in Geneva held from 6 to 10th April 2005 brought home medals each in different categories (5 Gold, 5 Silver & 3 Bronze).

Prof. Dr. Abu Bakar Salleh and his research team from the Faculty of Biotechnology & Biomolecular Sciences won a Gold medal for their research on *"Chirazip™ — a highly enantioselective enzyme"*.

Assoc. Prof. Dr. Abdul Rashid Mohamed Shariff and his research team from the Faculty of Engineering won a Gold medal for their research on *"GIS Based Cell Phone Signal Strength Predictor"*.

Assoc. Prof. Dr. Arfah Salleh and her research team from the Graduate School of Management won two Gold medals for their research on *"GenerReS (Generating financial Reports Simulation) Software"* and *"AssessUrBook"*.

Assoc. Prof. Dr. Badilshah Sham Baharin and his research team from the Faculty of Food Science & Technology won a Gold medal for their research on *"Extraction of Vitamin E from Palm Fatty Acid Distillate by Adsorption Chromatography"*.

Recipients of Silver and Bronze medals are given below:

	Medal	Award Recipient
1.	*Silver*	Borhanuddin Mohd (Prof. Dr.) — *Engineering*
2.	*Silver*	Irmawati Ramli (Dr.) — *Science*
3.	*Silver*	Kamel Ariffin Mohd. Atan (Prof. Dato' Dr.)—*INSPEM*
4.	*Silver*	Mahiran Basri (Prof. Dr.) — *Science*
5.	*Silver*	Noorbatsa Yahya (Dr.) — *Science*
6.	*Bronze*	Faridah Abdullah (Assoc. Prof. Dr.) — *Science*
7.	*Bronze*	Ishak Aris (Assoc. Prof. Dr.) — *Engineering*
8.	*Bronze*	Jalaluddin Harun (Dr.) — *ITMA*

Invention, Research and Innovation Exhibition (PRPI 2005)

The Research Management Centre, UPM organised the Invention, Research and Innovation 2005 exhibition or *Pameran Rekacipta, Penyelidikan & Inovasi 2005* (PRPI 2005) from 1-19 March 2005 at various faculties and institutes across the university in order to further promote research. The opportunity gave many young talents to exhibit their new innovations and R&D products. In conjunction with this exhibition, RMC organised a grand event at the Sultan Salahuddin Abdul Aziz Shah Cultural & Arts Centre, UPM on 13 May 2005. About 480 medals in different categories of Gold, Silver and Bronze were given away to our deserving vibrant scientists and researchers. The event was officiated by the MOSTI Parliament Secretary, YB. Prof. Datuk Dr. Mohd. Ruddin Abdul Ghani representing the Minister of Science, Technology and Innovation, YB. Dato' Sri Jamaluddin bin Dato' Mohd. Jarjis.

Faculty of Science won the highest number of awards, followed by Engineering, Medicine and Health Sciences, Human Ecology and Agriculture.

Each award winner is an inspiration to us.

(Turn to centre page for pictorial news.)

New Research Institutes and Centers

Resources and services are the enablers and facilitators that provide the infrastructural support and complementary services critical to the operations of the University. They are also effective co-ordinators fostering synergy within the diverse UPM intellectual community and with the community at large.

UPM has established several new facilities to promote R&D. These include the following:

- Institute for Agricultural Extension (IPP) — *Prof. Dr. Azizi Hj. Hamzah*;
- Institute for Food & Agriculture Policy Research (IKDPM) — *Prof. Dr. Fatimah Arshat*;
- Institute for Halal Food (IMH) — *Prof. Dr. Yaakob Che Man*;
- Institute for Plantation Studies — *Prof. Dr. Makhdzir Mardan*;
- Institute of Tropical Bio-Composite (IBT) — *Dr. Jalaluddin Harun*;
- Agriculture Science Matriculation Centre — *Prof. Dr. Rosli Mohamad*;
- Centre for Agricultural Entrepreneur Development (PPUT) — *Prof. Ir. Dr. Mohamed Daud*;
- Centre for Food & Agricultural Mechanization and Automation (PMPPM) — *Prof. Ir. Dr. Desa Ahmad*;
- Centre for Strategic Research & Food Innovation (PKSDIM) — *Prof. Dr. Sabrah Yusof*;
- *Graduate School of Agriculture (GSA)* — to be established.

FactFile

For the record

1 *Dr.Raha Abd. Rahim, incoming new deputy director, Publication, Promotion & System Unit, RMC*

2 *Dr.Fakhru'l-Razi Ahmadun, deputy director, Policy, Planning & Finance Unit, RMC*

1 We are very pleased to welcome Associate Professor Dr. Raha Abd. Rahim as Deputy Director, Research Management Centre and Head, Publication, Promotion & System Unit, RMC. She will also be an Executive Editor on the board of Executive Editors of *Synthesis* as of April 2005.

Raha earned her BSc (Microbiology) and MSc (Microbial Genetics) from the University of Oklahoma, USA. She was then offered to work with Universiti Putra Malaysia as a tutor with the Department of Biotechnology. Soon thereafter, Raha received her Doctorate, a Ph.D in Molecular Biology from the University of Strathclyde, Glasgow in 1995. She then continued to serve UPM as lecturer attached to the department of Bioprocess Technology at the Faculty of Biotechnology and Biomolecular Sciences.

Her primary research and teaching interests spans over areas of genetic engineering and microbial recombinant DNA technology; more specifically in the development of recombinant vaccine delivery system, molecular detection, identification of microbes, bacterial surface display, and development and study of plasmids from Grams-positive organisms. She is a keen researcher who holds several research grants to her credit. She has supervised and graduated several postgraduates (PhD and MSc) students in the area of molecular biology and genetic engineering.

During her academic and professional career, she has published more than 50 publications in journals and proceedings in various international and national journals, and has won awards at several national exhibitions.

Alongside this, she is the current President of the Malaysian Society for Microbiology and sits on several national panels related to Biotechnology and Bioscience R&D in Malaysia.

She could now be reached at 03 8946 6183 (RMC), 03 8946 7513 (faculty), or via email at raha@biotech.upm.edu.my.

2 Dr. Fakhru'l-Razi Ahmadun, Associate Professor and Lecturer in Environmental Engineering from the Faculty of Engineering who took over as the new incoming deputy director Research Management Centre to head the Publication, Promotion and System Unit of the Research Management Centre effective 16 January 2005 has moved to the Policy, Planning and Finance Unit, RMC with effect from 1 April 2005.

He could now be reached at 03 8946 6185 (RMC), 03 8946 6304 (faculty), or via email at fakhrul@eng.upm.edu.my.

Check it out

UPM R&D Directory, Part 2: Staff Profile—Faces of Innovation, Edition 2005, published by the Publication, Promotion and System Unit, Research Management Centre, UPM. Editors: Nayan Deep S. Kanwal, Zulkifli Idrus and Raha Abd. Rahim. ISSN 1675-7823 is now in the press and will be available for distribution from July 2005.

Read this – a call for contributions!!

If you have any contributions comprising feature articles or research write-ups that you would like us to publish in the esteemed columns of Synthesis, or any suggestions that you may wish to make for the forthcoming issues, please send them to: The Managing Editor, Synthesis, Publication, Promotion and System Unit, Research Management Centre, 4th Floor, Administration Building, 43400 UPM, Serdang, Selangor, Malaysia or via the Internet to ndeeps@admin.upm.edu.my or rschinfo@admin.upm.edu.my

The editor reserves the right to edit articles for clarity and

A Glance at Research Inventions & Innovations at UPM[1]

Continued from Issue 8, 1st Quarter (March 2005)...

No.	Faculty/ Institute	Researcher	Innovation	Research Cluster	Project Number	Allocation
210.	Human Ecology	Musa Bin Abu Hassan	Masyarakat luar bandar dan projek ICT luar bandar: Satu usaha pembentukan k-komuniti	SSH	07-02-04-0231 EA001	RM145,000
211.	Human Ecology	Nurizan Yahaya	Poverty Among Elderly Malaysians: Towards Productive Ageing	SSH	07-02-04-0733-EA001	RM180,700
212.	Human Ecology	Nurizan Yahaya	Sikap dan amalan golongan Melayu Bandar terhadap pencapaian Wawasan 2020	SSH	07-02-04-0737-EA001	RM92,000
213.	Human Ecology	Rohani Abdullah	Parental Involvement and Children's Computer Usage and Abilities	SSH	07-02-04-0738 EA001	RM128,000
214.	Human Ecology	Sharifah Norazizan Syed Abd. Rashid	Culture, Conservation, and Heritage in the Context of City Marketing-Towards Developing Sustainable Urban Development Strategies	SSH	07-02-04-0234 EA001	RM177,984
215.	Human Ecology	Zaid Ahmad	Perception and Understanding of Rural Malaysians Towards the Process of Globalization	SSH	07-02-04-0235 EA001	RM241,000
216.	Institute for Mathematical Research (INSPEM)	Kamel Ariffin Mohd. Atan	Interactive and animated mathematics for math education	ITM	07-02-04-0424 EA001	RM185,000
217.	Institute for Mathematical Research (INSPEM)	Wan Zah Wan Ali	A study of mathematical values among Malaysian mathematics secondary school teachers	SSH	07-02-04-0742-EA001	RM197,160
218.	Institute of Advanced Technology (ITMA)	Azizi Ali @ Ibrahim	Database management system for recreational resources in Peninsular Malaysia, analysis of demand, supply and participation	SSH	07-02-04-0663-EA001	RM175,640
219.	Institute of Advanced Technology (ITMA)	D.N. Trikha	Development of Optimal Flooring and Roofing Prefabricated Systems for Industrialized Construction	SAE	03-02-04-0142 EA001	RM195,000
220.	Institute of Advanced Technology (ITMA)	Napsiah Ismail	Development of Intelligent Vision-based Parts Recognition System for Flexible Manufacturing Cell	SAE	09-02-04-0823-EA001	RM115,400
221.	Institute of Advanced Technology (ITMA)	Paridah Md.Tahir	Development of dimensionally stable wood composite through surface enhancement of wood particles/fibres (Synthesis and evaluation of low molecular weight phenol formaldehyde resin for the production high dimensionally stable oriented strand board)	SAE	03-02-04-0411 EA001	RM147,560
222.	Institute of Advanced Technology (ITMA)	Rahmita Wirza	Computer Aided Orthopedic Surgery	HAS	04-02-04-0496 EA001	RM204,560
223.	Institute of Advanced Technology (ITMA)	Rahmita Wirza	Surface design of total knee replacement using virtual manufacturing	SAE	04-02-04-0592-EA001	RM156,360
224.	Institute of Advanced Technology (ITMA)	Wong Shaw Voon	Development of Artificial Intelligence (AI) based Expert System for Optimum Turning Process	SAE	03-02-04-0171 EA001	RM164,140
225.	Institute of Bioscience (IBS)	Ab.Rani Bahaman	Development of a multivalent leptosspiral sub unit vaccine against leplospirisis in livestock and pet animal	AFF	01-02-04-0001 EA001	RM178,256
226.	Institute of Bioscience (IBS)	Ab.Rani Bahaman	Development of a rapid nucleic acid based diagnostic kit for human rotavirus	BAB	01-02-04-0002 EA001	RM106,000
227.	Institute of Bioscience (IBS)	Faridah Qamaruz Zaman	Identification of AFLP fragments linked to fruit skin colour in oil palm (Elaeis guineensis Jacq)	AFF	01-02-04-0022 EA001	RM129,000
228.	Institute of Bioscience (IBS)	Ho Yin Wan	Studies on the mass production and storage of lactobacillus probiotics for chickens	AFF	01-02-04-0034 EA001	RM189,000
229.	Institute of Bioscience (IBS)	Johnson Stanslas	Synthesis of novel andrographolide derivatives and evaluation of their antitumour potential	HAS	06-02-04-0603-EA001	RM189,500
230.	Institute of Bioscience (IBS)	Khozirah Shaari	Identification and quantification of chemical markers and bioactive constituents of gynura procumbens (lure) merr	BAB	09-02-04-0619-EA001	RM157,000
231.	Institute of Bioscience (IBS)	Khozirah Shaari	Inhibitors of leukotriene biosynthesis from natural products as anti-asthmatic agents	HAS	06-02-04-0214 EA001	RM191,320
232.	Institute of Bioscience (IBS)	Mohd. Said Saad	Genetic diversity and conservation of phyllanthus spp.genetic resources for development of variety for anti cancer	BAB	01-02-04-0088 EA001	RM163,000
233.	Institute of Bioscience (IBS)	Muhammad Nazrul Hakim Abdullah	Anti-inflammatory and anti-microbial properties of Channa spp. extracts.	BAB	06-02-04-0605-EA001	RM232,000
234.	Institute of Bioscience (IBS)	Sieo Chin Chin	The effects of b-glucanase produced by lactobacillus- probiotics on the growth performance of broilers	AFF	01-02-04-0113 EA001	RM178,000
235.	Institute of Bioscience (IBS)	Sieo Chin Chin	Rapid Identification of Several Lactobacillus-Probiotic Strains for Poultry Using Molecular Biology Techniques	BAB	09-02-04-0765-EA001	RM172,256
236.	Institute of Bioscience (IBS)	Tan Wen Siang	Detection of hepatitis B core antigen with a recombinant bacteriophage	BAB	06-02-04-0608-EA001	RM100,000
237.	Institute of Community Development and Youth Studies (PEKKA)	Azimi bin Hamzah	Youth as a foundation for unity and solidarity: A study of inter ethnic tolerance	SSH	07-02-04-0740-EA001	RM190,250

[1] **Data presented IRPA RM-8 (as at Cycle 1, 2004); Total 416 EAR Grants, sorted by PTJ & Name.**

to be continued...

†The description of the some of the above Inventions and Innovative research products available for commercialisation at UPM are contained in the books—"R&D at UPM: Creating New Frontiers of Innovative Research", First Edition, and "R&D at UPM: Research Snapshots", First Edition, Editors: Nayan Deep S. Kanwal, Mohd. Shahwahid Hj. Othman and Sidek Hj. Abd. Aziz, Published by Research Management Centre (RMC), UPM, available from Publications & Promotion Unit, Administration Building, Universiti Putra Malaysia, 43400 UPM, Serdang, Selangor Darul Ehsan, Malaysia, Tel: +603 8946 6028 / 8946 6192, Fax: +603 8942 6539, e-mail: rschinfo@admin.upm.edu.my

Synthesis

BackIssues

JUNE 2003 — *Issue 1, 2nd Quarter*

Editorial: First Inaugural Issue
Spotlight: Research Clusters
Regulars

- BioCarrier™, a Novel Molecular Carrier from Newcastle Disease Virus
- ZAPPA™, the Rice seeds germination enhancer and the Control of "Padi Angin" Infestation
- Enzyme – Aided Peeling of Local Citrus Fruit – An Alternative to Conventional Methods
- Development of Malaysian Isolate of Spodoptera litura nucleopolyhedrovirus (SpltNPV) biopesticide for controlling cruciferous vegetable pest, Spodoptera litura (Fabricius) (Lep. Noctuidae)
- Production of Natural Flavoring and Coloring Powders from Local Edible Plants by Using Different Drying Methods
- Bugs at Work: The Oil-Busters

SEPTEMBER 2003 — *Issue 2, 3rd Quarter*

Editorial: A Feel for Success
Spotlight: Reinventing yourself— How do you get established in the research world?
Regulars

- Enhancing Tolerance to Heat Stress, Resistance to Infectious Bursal Disease and Expression of Heat Shock Protein 70 in Broiler Chickens by Early Age Feed Restriction
- The Use of the EPP Foam as a Liner Material for Motorcycle Helmet – Finite Element Simulation and DOE Optimization
- Biocompost from Food Agricultural and Industrial Wastes
- NDPatch™: A simple Solution to Newcastle Disease Virus Pathotyping
- Career Indecision and Career Game Intervention Technology
- Novel Polynucleotide Vaccine NUCLEOCEPTIN™ for an Effective Fertility Control in Animals
- The Generating Financial Reports Simulation (GenerRaS) Software
- Cost Benefit Analysis Simulation for Development Project Evaluation

Research Happenings

- Expo S&T Invention & Innovation Awards
- UPM Invention and Research Exhibition &

DECEMBER 2003 — *Issue 3, 4th Quarter*

Editorial: Working together to raise standards
Spotlight: Academic Writing
Research Highlight: IPTA 2003 – Investing in Innovation
Regulars

- Production of Bacterial Inoculants as Biofertilizer and Bioenhancer
- Design and Fabrication of CVD for Nanotechnology Research
- Development of Biopesticide for Managing Cruciferous Vegetable Pest
- Genetic Engineering of Bananas for Tolerance to Fusarium Wilt Disease
- Cholera DNA Vaccine
- Detection of lard in Chocolate by Fourier Transform Infrared (FTIR) Spectroscopy for "Halal" Authentication
- Low Field Magnetoresistance in Bulks and Films of Manganite Perovskites for Sensing Devices
- Environmental Friendly Synthetic Lubricant from Palm Oil
- SMS Gateway Interface

Feature

- Bridging the Information and Commercial Gap Exploiting the Knowledge Factor of IRPA

MARCH 2004 — *Issue 4, 1st Quarter*

Editorial: Serving Community and Country
Spotlight: Funding Opportunities
Research Highlight: Great expectations— Research the key factor
Regulars

- An Integrated Management for the control of Bacterial Wilt of Tomato Caused by Ralstonia solanacearum
- Genetic Variability of Four Sheep Breeds in Malaysia
- Design and Evaluation of a Comfortable Motorcycle Helmet with Bio-composite Shell for Tropical Climates
- Commercial Production of Economically Important Planting Materials Using Tissue Culture Technologies
- Development of Rice Bran Nutraceuticals with Cardioprotective Properties
- Putranet – Virtual Office

Feature

- Responses of Timber Concessionaires to Selected Policy Instruments

Research Happenings

- R&D Commercialization Luncheon
- Work Quality Enhancement Course
- MoU between UPM & MINT
- Science Motivation Dialogue with National Young Scientist Award Winners
- Down the Memory Lane

JUNE 2004 — *Issue 5, 2nd Quarter*

Editorial: Promoting Innovation: Pivotal Role in Raising Standards
Spotlight: Science and Our Future— Looking Ahead: Aspirations for a NBL from UPM!
Research Highlight: UPM— Making of a Research University
Regulars

- Development of Standardised Functional Foods from Centella asiatica (L) urban
- ZAPPA™ – The Rice Seeds Germination Enhancer and the Control of "Padi Angin" Infestation
- Palm Oil based synthetic bio Lubricant
- Optical Layer Automatic Protection Switch (APS) Module
- CRFNanopath: A Novel Nanocomposite-Based Controlled Release Formulation
- Recovery of Vitamin E from Palm Fatty Acid Distillate Using Neutralization-adsorption Chromatography Method
- E-ORY – Natural Antioxidant Rich Nutraceutical Formulation
- MachT™ Impactor, Pendulum Impact Test Unit

Research Happenings

- Geneva 2004— 32nd International Exhibition of Inventions, New Techniques & Products
- Patent Workshop
- Cluster Workshop
- National Innovation Summit 2004

SEPTEMBER 2004 — *Issue 6, 3rd Quarter*

Editorial: Re-Inventing our Future
Spotlight: Science Citation Index
Research Highlight: Real Goal of University Education – formation of personalities
Regulars

- Copper-coated Urea for Rice Production
- Production of Gelatin from Red Tilapia Skins
- Palm Oil Based Fatty Acid Impregnated in Gypsum Wallboard
- Intelligent Asphalt Mix Tester (Turamesin)
- UPM Digital Moisture Meter
- Painting Robot for House and Building
- Bacteriocins of Lactic Acid Bacteria
- Educational Software for Teaching Introductory Calculus at the University Level
- MB5odex™ – New Green Palm-Based Fine Organics for Industry
- Spodbill™ for Your Pest Problem

Research Happenings

- Introductory Research Workshop for New Lecturers
- Nobel Laureate's Visit to UPM
- Nobel Laureate— Exhibition of Research

Letters to the Editor

If you have any comments about the content of the publication or any contributions that you may wish to make for the forthcoming issues, please send them to: The Managing Editor, *Synthesis*, Publication and Promotion Unit, Research Management Centre, 4th Floor, Administration Building, 43400 UPM, Serdang, Selangor, Malaysia or via the Internet to ndeeps@admin.upm.edu.my. The editor reserves the right to edit articles for clarity and space before publication.

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Scientists must be made aware of how important the impact of their work is and its possible applications on society and public opinion. It is hoped that this digest will provide the opportunity to interact particularly through feedback or direct mail to the scientist from either the private sector or by scientists from other government research institutions.

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